

**RADIATION HARDENED
 NPN SILICON SWITCHING TRANSISTOR**
Qualified per MIL-PRF-19500/255

DEVICES

2N2221A	2N2222A
2N2221AL	2N2222AL
2N2221AUA	2N2222AUA
2N2221AUB	2N2222AUB
2N2221AUBC	2N2222AUBC

LEVELS

- JANSM – 3K Rads (Si)**
- JANSD – 10K Rads (Si)**
- JANSP – 30K Rads (Si)**
- JANSL – 50K Rads (Si)**
- JANSR – 100K Rads (Si)**
- JANSF – 300K Rads (Si)**
- JANSG – 500K Rads (Si)**
- JANSH – 1MEG Rads (Si)**

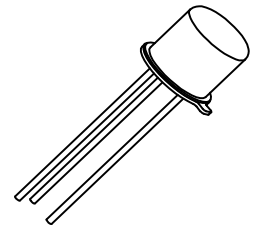
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit	
Collector-Emitter Voltage	V_{CEO}	50	Vdc	
Collector-Base Voltage	V_{CBO}	75	Vdc	
Emitter-Base Voltage	V_{EBO}	6.0	Vdc	
Collector Current	I_C	800	mAdc	
Total Power Dissipation @ $T_A = +25^\circ\text{C}$	P_T	0.5	W	
2N2221A, L		2N2222A, L		0.65
2N2221AUA		2N2222AUA		0.50
2N2221AUB, UBC		2N2222AUB, UBC		
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200	$^\circ\text{C}$	

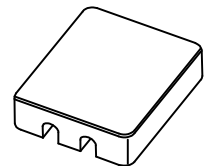
THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	325	$^\circ\text{C/W}$	
2N2221A, L		2N2222A, L		210
2N2221AUA		2N2222AUA		325
2N2221AUB, UBC		2N2222AUB, UBC		

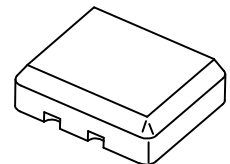
- Derate linearly 3.08 mW/ $^\circ\text{C}$ above $T_A > +37.5^\circ\text{C}$
- Derate linearly 4.76 mW/ $^\circ\text{C}$ above $T_A > +63.5^\circ\text{C}$



TO-18 (TO-206AA)
 2N2221A, 2N2222A



4 PIN
 2N2221AUA, 2N2222AUA



3 PIN
 2N2221AUB, 2N2222AUB
 2N2221AUBC, 2N2222AUBC
 (UBC = Ceramic Lid Version)



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 Website: <http://www.microsemi.com>

TECHNICAL DATA SHEET

RADIATION HARDENED NPN SILICON SWITCHING TRANSISTOR *Qualified per MIL-PRF-19500/255*

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 10\text{mA}_{dc}$	$V_{(BR)CEO}$	50		Vdc
Collector-Base Cutoff Current $V_{CB} = 75\text{Vdc}$ $V_{CB} = 60\text{Vdc}$	I_{CBO}		10 10	μAdc ηAdc
Emitter-Base Cutoff Current $V_{EB} = 6.0\text{Vdc}$ $V_{EB} = 4.0\text{Vdc}$	I_{EBO}		10 10	μAdc ηAdc
Collector-Emitter Cutoff Current $V_{CE} = 50\text{Vdc}$	I_{CES}		50	ηAdc
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio $I_C = 0.1\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	30 50		
$I_C = 1.0\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	35 75	150 325	
$I_C = 10\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	40 100		
$I_C = 150\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	40 100	120 300	
$I_C = 500\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	20 30		
Collector-Emitter Saturation Voltage $I_C = 150\text{mA}_{dc}$, $I_B = 15\text{mA}_{dc}$ $I_C = 500\text{mA}_{dc}$, $I_B = 50\text{mA}_{dc}$	$V_{CE(sat)}$		0.3 1.0	Vdc
Base-Emitter Voltage $I_C = 150\text{mA}_{dc}$, $I_B = 15\text{mA}_{dc}$ $I_C = 500\text{mA}_{dc}$, $I_B = 50\text{mA}_{dc}$	$V_{BE(sat)}$	0.6	1.2 2.0	Vdc



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DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0\text{mA}$, $V_{CE} = 10\text{Vdc}$, $f = 1.0\text{kHz}$ 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	h_{fe}		30 50	
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 20\text{mA}$, $V_{CE} = 20\text{Vdc}$, $f = 100\text{MHz}$	$ h_{fe} $		2.5	
Output Capacitance $V_{CB} = 10\text{Vdc}$, $I_E = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{obo}		8.0	pF
Input Capacitance $V_{EB} = 0.5\text{Vdc}$, $I_C = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{ibo}		25	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time See figure 8 of MIL-PRF-19500/255	t_{on}		35	ns
Turn-Off Time See Figure 9 of MIL-PRF-19500/255	t_{off}		300	ns

(3) Pulse Test: Pulse Width = 300µs, Duty Cycle ≤ 2.0%.